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Remarks

Remarks Regarding Amendments To The Claims

1. Claim 1 is amended by specifying that a reference uses dynamic binding (lines 17 – 18), as supported in the description:
 - a) The application discloses steps involving dynamic binding as it is commonly understood (see http://en.wikipedia.org/wiki/Name_binding, Revision as of 23:35, 7 January 2007) in detail (3:[0053] – [0060]), in particular by registering dependencies during the evaluation of references.
 - b) Dependencies are registered on aggregate elements (3:[0054], see "Order A", "Delivery Address") as well as on simple elements (3:[0054], see "Zip Code"). The application gives special consideration to the case of elements being added (3:[0053], 3:[0056], 3:[0059]) or removed (3:[0053]) and includes dynamic multi-element list references (3:[0055] – 3:[0056], see wild card "*").
 - c) The application specifically discloses that "Each evaluation determines the dependencies to be registered anew" (3:[0057]), enabling dependencies (and thus the targets of their respective references) to change dynamically as expressions are executed.
 - d) The application discloses a wild card operator in expression references to address a variable number of elements without requiring these elements to be known at the time the expression is specified (3:[0048], 3:[0055], 3:[0056], see wild card "**"). Another embodiment offers dynamically bound references in an object-oriented form (4:[0072], see "COMPONENTS(Class)").
 - e) The application discloses a method, which enables the user to specify, for example, a sum over a number of items (3:[0055], Fig. 3, see Items!Amount), where such sum is automatically updated as items are added or removed (3:[0056]) without requiring any change in the expression.
2. Claim 1 is further amended to more clearly specify the hierarchical data structure (lines 7 – 12) and the notion of modeling its structural configuration (lines 4 – 6, 13), harmonizing it with its latest PCT version (PCT/EP 03/50030, see IPER annex).
 - a) It is specified what constitutes an element, as supported by the description (1:[0010], see "elementary structures", 2:[0034] – [0037]).
 - b) It is specified that modeling includes steps to add hierarchy levels and elements to a hierachic data structure, as supported by the description (1:[0014], 2:[0036], see "To manipulate ...", "To add...").
3. Claim 2 is canceled.
4. Claim 3 is amended to more clearly specify the scope of object-oriented modeling, as supported by the description (1:[0015]). It now corresponds to claim 2 in its latest PCT version (PCT/EP 03/50030, see IPER annex).
5. The new claim 13 extends claim 1 by adding steps which yield hierarchical contents (an aggregate structure) as the result of an expression. This includes creating new elements at newly created positions in the hierarchy. Claim 13 now corresponds to claim 3 in its latest PCT version (PCT/EP 03/50030, see IPER annex). The description supports this as follows:

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- a) Disclosed are elements comprising the attributes "Name" and "Expression" (2:[0032]). Further disclosed are the contents of a container as a list of said elements (2:[0036]). Then, it is disclosed, that an expression specified for a container element yields a list of said elements (2:[0036], next to last sentence).
 - b) Additional aggregating elements, such as list, set and bag, are disclosed (2:[0037]), as well as the fact, that such aggregates differ from a container in having elements, which lack the "Name" attribute.
 - c) Since the container and other aggregates disclosed otherwise differ only in the way, their elements are arranged and referenced, the steps disclosed for an expression yielding a container's elements can be directly and unambiguously applied to the other aggregates.
6. Claims 4, and 6 to 12 are amended to comply with 35 U.S.C. 112 and MPEP 608.01(n) requiring multiple dependent claims to not depend on any other multiple dependent claim.
7. A credit card payment form is attached to cover extending the total number of claims for fee calculation purposes to 21.

Remarks Regarding Patentable Distinctions Over Prior Art

- 8. The application (published as US 2005/0149906 A1) discloses a method to model a hierarchical data structure, wherein parts of that data structure are dynamically computed through functional expressions.
- 9. The reference R1 (Thomsen et al. USPN 5,987,246) discloses a method to create a data flow program.
- 10. The amended claim 1 patentably distinguishes the application over reference R1 for the following reasons:
 - a) The reference R1 requires expression references (connections from input variables to output variables) to be statically bound (hard-wired through graphical user interaction). Using the method of the reference R1, it is the responsibility of the user to manually add appropriate references (connections) as targets (output variables, possibly as part of entire virtual instruments) are added or removed.
 - b) The amended claim 1 specifies a reference capable of dynamic binding, where a reference's target elements (not just a target's respective contents) may change dynamically during execution without requiring the user to re-configure the reference.
 - c) The application's method is thus much more suitable for the creation and execution of business applications, as these frequently exhibit structural changes at run-time. An example is in order management as shown in Fig. 3 of the application, where line items are entered one by one at run-time, while the total amount is to be computed by an expression specified at design-time. Using the application's method, such an expression does not require referenced elements (the individual item amounts) to be known (or even to exist) at the time the reference is added to the expression.
- 11. The amended claim 3 patentably distinguishes the application over reference R1 beyond the reasons given for claim 1 for the following additional reasons:
 - a) The reference R1 does not disclose steps to model its data structure (a collection of virtual instruments) in an object-oriented way. Instead, the term 'object-

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'oriented' is used in conjunction with programs outside the scope of reference R1's modeling methods (6:32 – 36).

- b) The amended claim 3 specifies a method to apply changes uniformly across several structures (object instances) of the same kind (class), by having a class structure represent the common features of objects separately from their contents. In conjunction with the amended claim 1, the amended claim 3 limits object-oriented modeling to affecting the hierarchical structure, thereby excluding external components, which are constructed in an object-oriented way by means outside the scope of the application's method.
 - c) The application's method thus employs object-oriented principles to ease the maintainability of large information systems. The description contains an example demonstrating the advantage of this method (4:[0063]).
12. The amended claim 3 patentably distinguishes the application over reference R1 beyond the reasons given for claims 1 and 2 for the following additional reasons:
- a) The reference R1 does neither disclose references to aggregate structures nor does it allow an aggregate structure to be the input or output value of a function ("virtual instrument").
 - b) The amended claim 3 specifies that an expression can return an aggregate structure.
 - c) The ability to refer to aggregate structures and to have expressions capable of yielding aggregate structures eases maintainability, as it avoids the pitfalls of duplicating information within the hierarchical structure and supports successful principles of software construction, such as recursive data structures. An example would be a customer (structure) containing a delivery address (structure) and several orders (structure). It would be possible to have an order element "delivery address" referring upwards to the delivery address of the customer structure. Whenever a delivery address were to be used within the order, it could be addressed by its respective order element and there would be no need to know that the delivery address resides in the customer structure higher up in the hierarchy.
13. As the remaining claims depend on claim 1, they are all considered to be patentable over reference R1.

Correspondence Information

14. The applicant's telephone number as dialed from the United States is 011 49 40 59456481. The applicant can normally be reached on 4:00 am – 1:00 pm (US Eastern Time Zone).

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